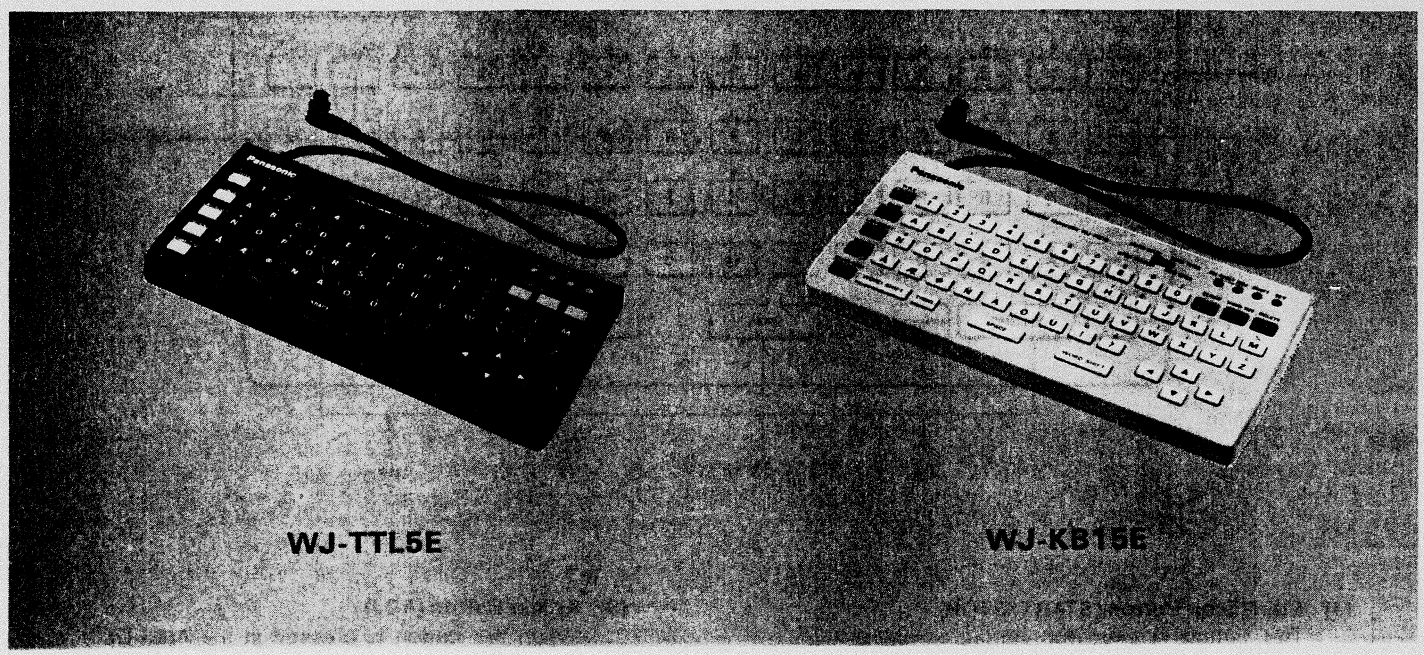
ORDER NO. AVS9006331C8

Service Manual

Character Generator

WJ-TTL5E/WJ-KB15E



SPECIFICATIONS

- **WJ-TTL5E/WJ-KB15E**

  Power Source : 9VDC, 0.09W

  Backup Battery : 1.5V×4, R03 or AAA type batteries

  Weight : 295g (without batteries)

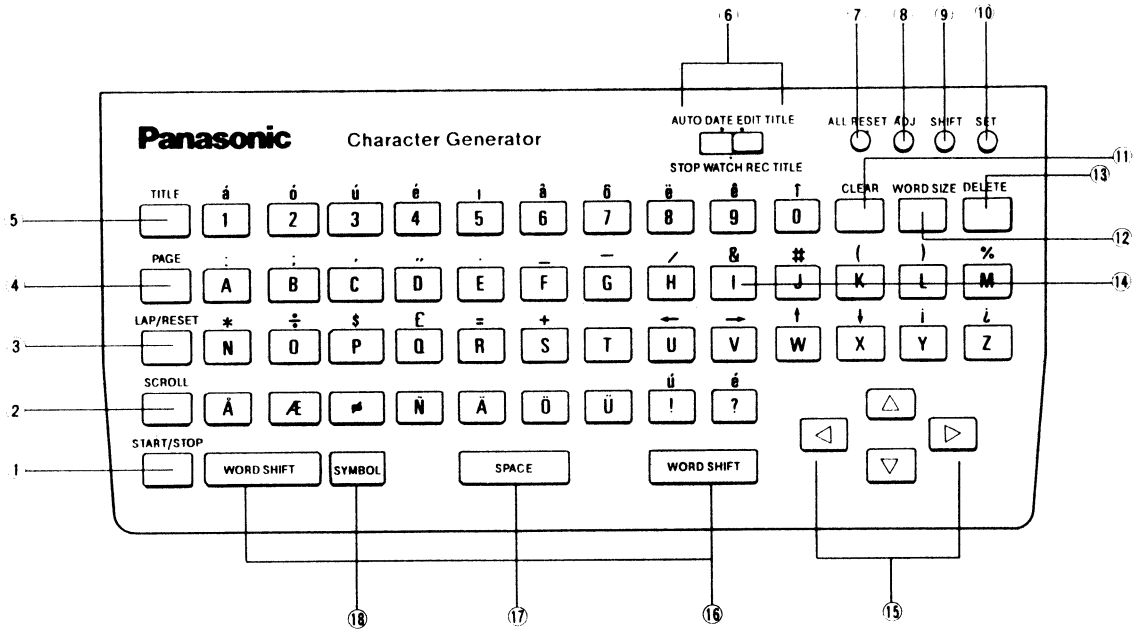
  Dimensions : 108(W)×23(H)×227(D)mm

Weight and dimensions shown are approximate.
Specifications are subject to change without notice.

Panasonic

Matsushita Electric Industrial Co., Ltd.
Central P.O. Box 288, Osaka 530-91, Japan

OPERATING CONTROLS AND THEIR FUNCTIONS



(1) Start/Stop Button (START/STOP)
This button is used for starting/stopping the stopwatch or for scrolling the titles.

(2) Scroll Button (SCROLL)
This button is used for scrolling the titles.

(3) Lap/Reset Button (LAP/RESET)
This button is used for displaying the lap time, resetting the stopwatch or the scroll.

(4) Page Button (PAGE)
The page is shifted by pressing this button.

PAGE1- →PAGE2- →PAGE3- →PAGE4- →PAGE5-
↑
PAGEA← -PAGE9← -PAGE8← - PAGE7← -PAGE6←

(5) Title Button (TITLE)
Titles on screen is displayed/disappeared by pressing this button.

(6) Mode Selection Switch (AUTO DATE/ EDIT TITLE/STOP WATCH/REC TITLE)
Auto Date, Edit Title, Stopwatch or Rec Title is selected by setting this switch.

(7) All Reset Button (ALL RESET)
When this button is pressed in the Edit Title mode, all of the recorded titles are deleted.

(8) Adjust Button (ADJ)
When this button is pressed in the Auto Date mode, time and date can be set as desired.

(9) Shift Button (SHIFT)
This button is used for shifting the blinking position of the date and time.

(10) Set Button (SET)
This button is used for changing the desired number of Date or Time to that in Auto Date mode.

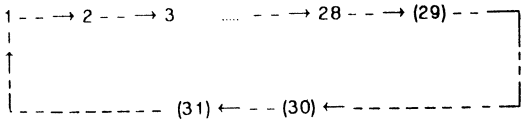
- Year Number

1987 - - - →1988 - - - →1989 ..... - - - →2010 - - -

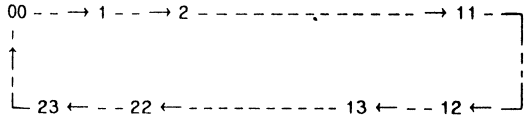
- Month Number

1 - - →2 - - →3 - - →4 - - →5 - - - - - - - - -
↑ ↓
12 6
↑ ↓
- - - - - - - - - 11← - - 10← - - 9← - - 8← - - 7

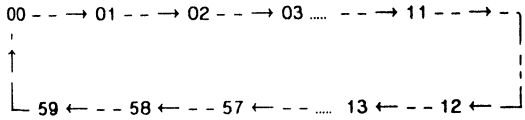
- Day Number



- Time Number



- Minute Number



(11) Clear Button (CLEAR)

By pressing this button while holding the Word Shift Button (16), the title on a displayed page is deleted.

(12) Word Size Selection Button (WORD SIZE)

This button is used for selecting the word size on a page - small, medium, medium large or large - in the Edit and Recording modes.

(13) Delete Button (DELETE)

By pressing this button, the left character of the cursor position is deleted.

(14) Character Key Board Buttons

By using these buttons, the alphabetic letters and numerical numbers/symbol or letters/symbol of Ä Ü Ö Å Æ Ñ Ø marks can be selected as a random accessory on the key board.

(15) Cursor Key

These key are used for shifting the cursor position, moving the titles position on a page (with the Word Shift Button held) or changing the scroll speed.

(16) Word Shift Button (WORD SHIFT)

By pressing this button, the alphabetic letters and numerical numbers/symbol or letters/symbol of Ä Ü Ö Å Æ Ñ Ø marks can be selected. And by pressing this button while holding other key, corresponding additional function shown in the following table appears.

	Function
Word Size Selection Button	To change the size of the characters of the line on which the cursor is placed.
Letter/Number/ Symbol Button	To input small letters while in the Capital Letter mode, or for inputting capital letters while in the Small Letter mode. In the symbol mode, this button has no effect.
Cursor Button	To move the titles.
Page Button	To change to the previous page.
Clear Button	To delete all titles on the page being displayed. (The page is also erased from the memory.)
Delete Button	To confirm the character input mode.

(17) Space Button (SPACE)

While the titles or scroll are edited, each space between words is set by pressing this button just in the same manner as that on the typewriter.

(18) Symbol Button (SYMBOL)

This button is used for inputting symbols.

CIRCUIT DESCRIPTIONS

1. Sync separation circuit

The composite sync signal from camera is supplied through inverter TR101 to IC101, where horizontal sync signal is detected and supplied to character generator IC3.

On the other hands, composite sync signal is supplied through TR102 to an integrator to detect vertical sync signal and it is then supplied through IC 102(C)to character generator.

2. Microprocessor circuit

The microprocessor circuit is consisting of main microprocessor IC1 and a RAM (random access memory) IC? for storing the titles.

Pin identification of IC1 is as follows.

Pin Indentification of IC 5

Pin NO.	Name	Descriptions
1	P41	Key scan input bus 2
2	P40	" 1
3	P53	" 8
4	P52	" 7
5	P51	" 6
6	P50	" 5
7	RESET	Reset IN(Reset:L)
8	X2	ClockPulse Generator
9	X1	"
10	P63	Address output bus 3
11	P62	" 2
12	P61	" 1
13	P60	" 0
14	P73	" 7
15	P72	" 6
16	P71	" 5
17	P70	" 4
18	P83	Data output bus 3
19	P82	" 2
20	P81	" 1
21	P80	" 0
22	P93	" 7
23	P92	" 6
24	P91	" 5
25	P90	" 4
26	Vss	Ground
27	P13/INT3	"
28	P12/INT2	"
29	P11/INT1	WRQ IN
30	P10/INT0	V.sync IN
31	PTH03	Mode select-1
32	PTH02	Mode select-2
33	PTH01	Mode select-3
34	PTH00	Mode select-4
35	T10	Clock IN
36	T11	"
37	23P	"
38	P22/PCL	CS OUT
39	P21/PTO0	Not used
40	P20/PTO0	Clock OUT
41	P03/SI	
42	P02/SO	
43	P01/SCK	WRQ IN
44	P00/INT4	
45	P123	Key scan output bus 3
46	P122	" 2
47	P121	" 1
48	P120	" 0
49	P133	Key scan output bus 7
50	P132	" 6
51	P131	" 5
52	P130	" 4
53	P143	" 3
54	P142	Address output bus 10
55	P141	" 9
56	P140	" 8
57	NC	Not used
58	VDD	+ 5V IN
59	P33	LDI OUT
60	P32	ADM OUT
61	P31	Mode select cont
62	P30	Key scan inputbus 0
63	P43	" 4
64	P42	" 3

3.Character Generator Circuit

The character signals generated by IC 3 is obtained at pin19 of IC3 and fed to camera through IC102, TR105,TR 106 and pin9 of CN1.

ADJUSTMENT PROCEDURE

1. Test Equipment Required

- Production Mixer WJ--MX12 or WJ-AVE5
- Color video monitor
- Oscilloscope (Dual trace, Delayed sweep)
- Frequency counter

2. Disassembling Procedure for adjustment

- Slide the cover/door of battery compartment as shown in Fig 2-1 and remove it.

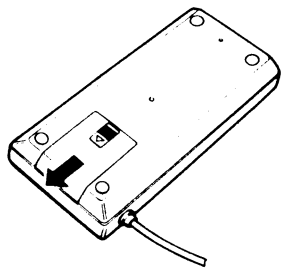


Fig 2-1

- Remove four screws holding bottom cover and remove it.

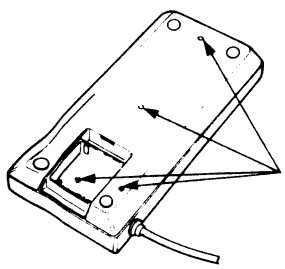
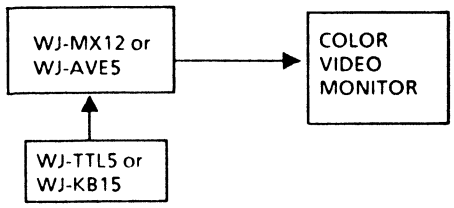


Fig 2-2

3. Connection

- Connect the coaxial cable between REC VIDEO OUT connector on the rear panel of WJ-MX12 and VIDEO IN connector of color video monitor.
- Terminate the color video monitor with 75 ohms.
- Connect character Generator WJ-TTL5 or WJ-KB15 to WJ-MX12 or WJ-AVE5.



4. Adjustment Procedure

- Refer to LOCATION OF TEST POINTS AND ADJUSTING CONTROLS on page5 for adjustment.

(1) Character Width adjustment

Test points:	**TP101(MASK)**	**Main board**
	TP103 (C. SYNC)	**Main board**
Adjust:	**VR101 (CHARACTER WIDTH)**	**Main board**

- Press the ALL RESET button.
- Press the WORD SIZE button so that the medium size (12 letters × 6 rows) appears on the monitor.
- Keep this condition until next adjustment (2) is completed.
- Connect the oscilloscope to TP101(MASK) and TP103(C.SYNC) on Main board.
- Adjust VR101 (CHARACTER WIDTH) so that T1 becomes 1.6µsec ± 0.5µsec.

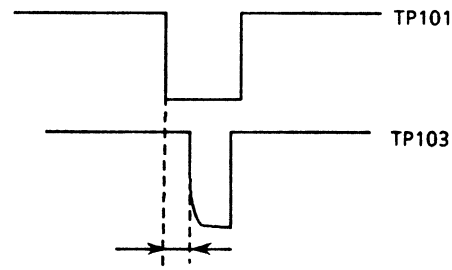


Fig 4-1

(2) Character Frequency adjustment

Test points:	**TP107(CHARACTER OUT)**	**Main board**
	TP103 (C. SYNC)	**Main board**
Adjust:	**VR1 (CHARACTER FREQ)**	**Main board**

- Connect the oscilloscope to TP107 (CHARACTER OUT) and TP103 (C. SYNC) on Main board.
- Adjust VR1 (CHARACTER FREQ) so that T2 becomes 8.5µsec ± 1µsec.

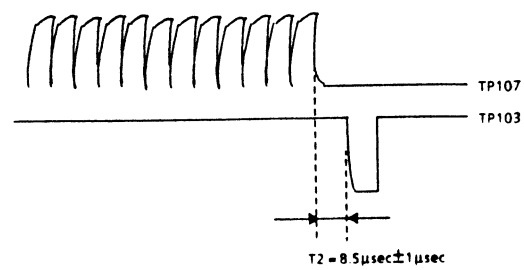


Fig 4-2

(3) Clock Oscillator adjustment

Test point: **TP1(CLOCK)** **Main board**
Adjust: **VC1 (CLOCK OSC)** **Main board**

- Connect the frequency counter to TP1 on Main board.
- Adjust VC1 (CLOCK OSC) for 40960.0 ± 0.1Hz.

LOCATION OF TEST POINTS AND ADJUSTING CONTROLS

Main board

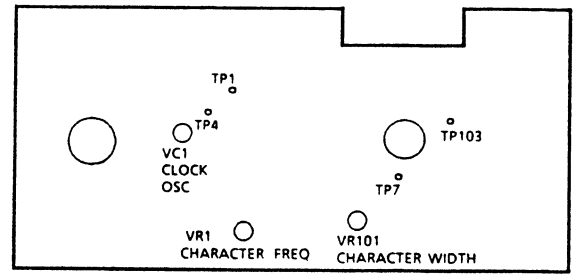
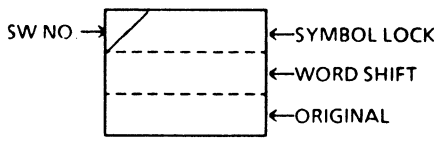
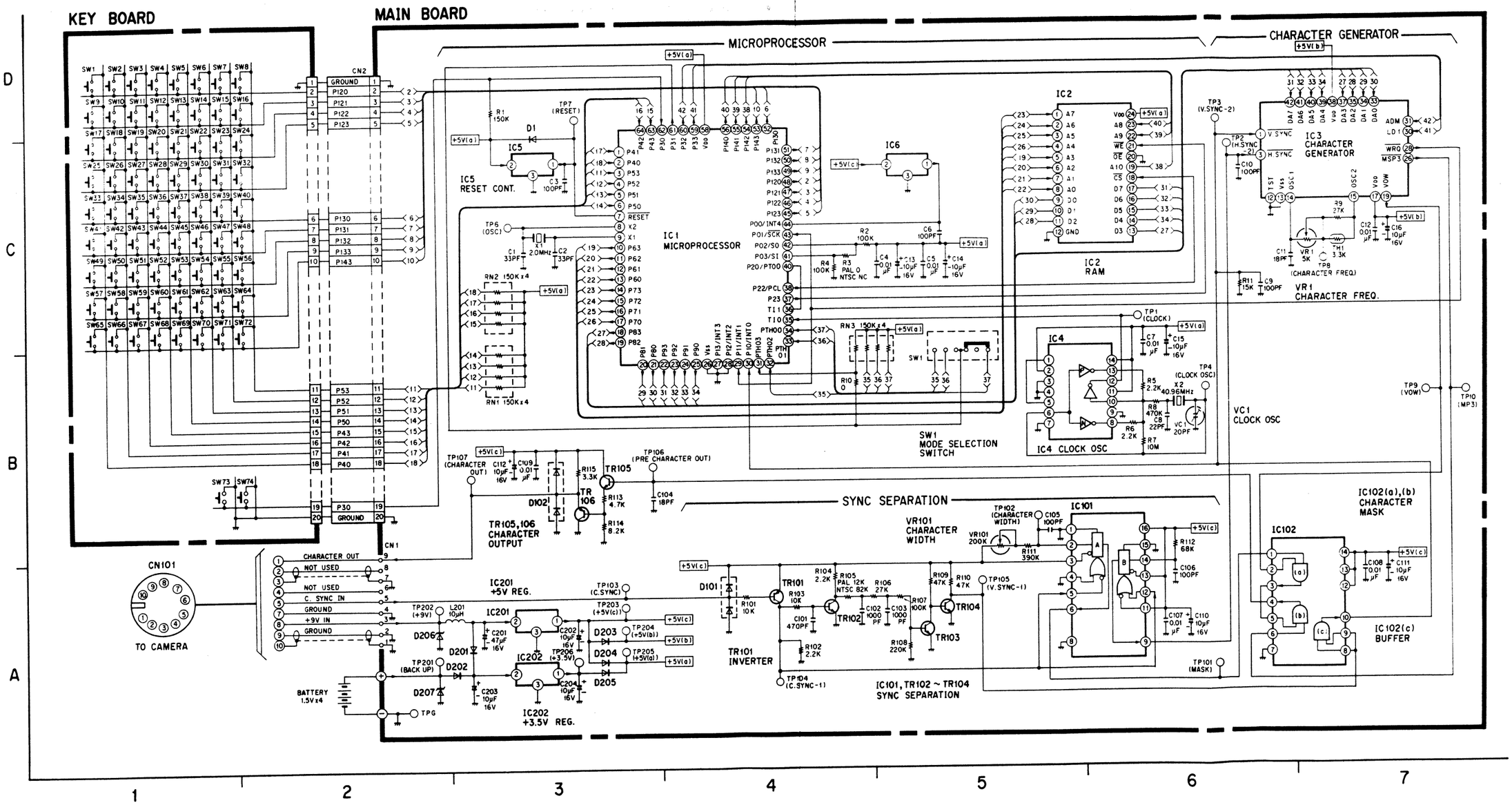


Table of Key-Scan

OUT / IN	P40	P41	P42	P43	P50	P51	P51	P52	P53
P120	1 : a A	2 ; b B	3 ' c C	4 " d D	5 . e E	6 - f F	7 _ g G	8 / h H	
P121	9 & i I	10 # j J	11 (k K	12) l L	13 % m M	14 * n N	15 ÷ o O	16 $ p P	
P122	17 £ q Q	18 = r R	19 + s S	20 × t T	21 ← u U	22 → v V	23 ↑ w W	24 ↓ x X	
P123	25 ¡ y Y	26 ¿ z Z	27 å Å	28 æ Æ	29 ø Ø	30 ñ Ñ	31 ä Ä	32 ö Ö	
P130	33 ü Ü	34	35	36	37	38 ¡ ù !	39 ¿ è ?	40	
P131	41 1 á 1	42 2 ó 2	43 3 ú 3	44 4 é 4	45 5 í 5	46 6 ã 6	47 7 õ 7	48 8 ë 8	
P132	49 9 ē 9	50 0 ī 0	51 SPACE	52	53	54 TITLE	55 SCROLL	56 START/ STOP	
P133	57 LAP/ RESET	58	59 SYMBOL	60 DELETE	61 ALL RESET	62 ADJ	63 SHIFT	64 SET	
P134	65 ◀	66 ▲	67 ▼	68 ▶	69	70 PAGE	71 CLEAR	72 WORD SIZE	
GND									73 74 WORD SHIFT



SCHEMATIC DIAGRAM OF WJ-KB15E/WJ-TTL5E



Main Board

<Index>

IC1	C4
IC2	C6
IC3	C7
IC4	B5
IC5	C3
IC6	C5
IC101	A6
IC102	A7
IC201	A3
IC202	A3
TR101	A4
TR102	A4
TR103	A5
TR104	A5
TR105	B3
TR106	B3
D1	C3
D101	A4
D102	B3
D201	A3
D202	A3
D203	A3
D204	A3
D205	A3
D206	A2
D207	A2

CONDUCTOR VIEW OF WJ-KB15E/WJ-TTL5E

<Voltages>

	IC1		IC1		IC1
Pin 1	4.6	Pin26	0	pin51	0
2	4.6	27	0	52	0.3
3	0	28	0	53	0.3
4	0	29	4.7	54	0
5	4.6	30	4.8	55	0
6	4.6	31	4.6	56	0
7	0	32	4.6	57	0
8	2.3	33	4.6	58	4.6
9	2.1	34	4.6	59	0
10	0	35	2.3	60	0
11	4.6	36	2.3	61	4.6
12	4.6	37	4.6	62	4.6
13	0	38	4.6	63	4.6
14	0	39	0	64	4.6
15	0	40	2.3		
16	0	41	0		
17	0	42	0		
18	0	43	4.7		
19	0	44	5.0		
20	0	45	0		
21	0	46	0		
22	4.6	47	0.1		
23	0	48	0		
24	4.6	49	0.1		
25	0	50	0.1		

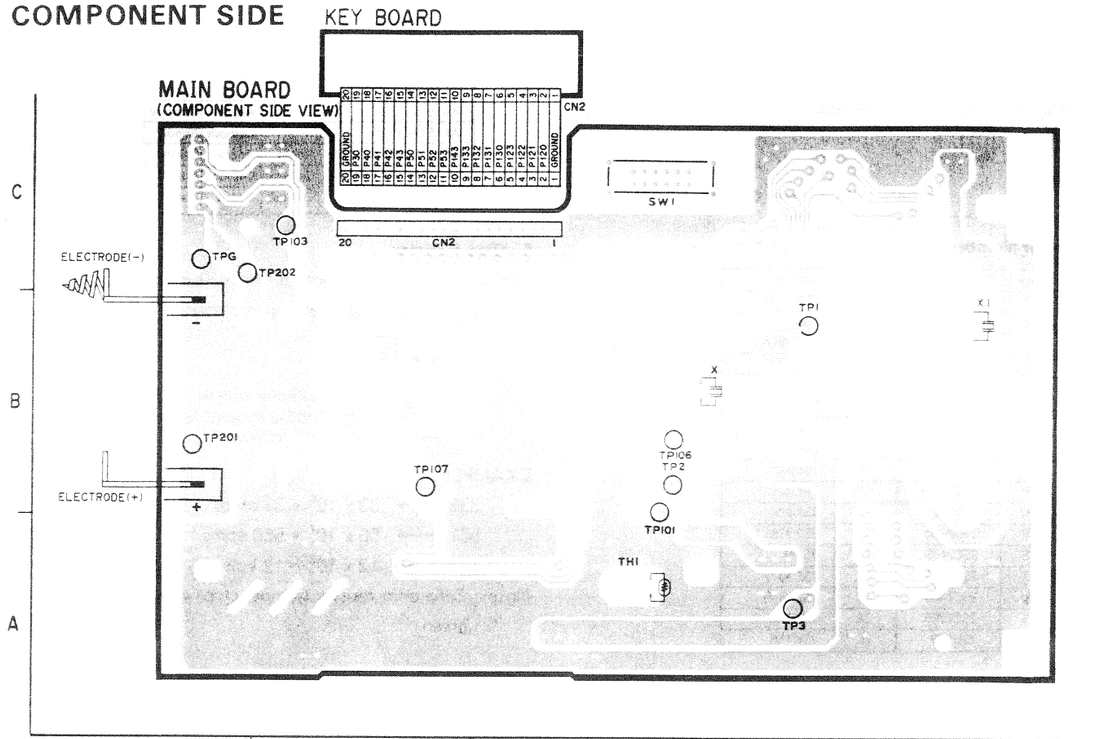
	IC2	IC4	IC5	IC6
Pin 1	0	4.6	(O) 4.6	(O) 5.0
2	0	4.6	(V) 4.6	(V) 5.0
3	0	0	(G) 0	(G) 0
4	0	0		
5	0	4.6		
6	4.6	1.9		
7	4.6	0		
8	0	2.2		
9	0	0		
10	0	2.3		
11	0	4.6		
12	0	2.3		
13	0	2.5		
14	0	4.6		
15	4.6			
16	0			
17	4.6			
18	4.6			
19	0			
20	0			
21	4.6			
22	0			
23	0			
24	4.6			
25				

	IC3		IC3
Pin 1	4.8	pin26	4.7
2	0	27	0
3	4.2	28	4.7
4	0	29	0
5	0	30	0
6	0	31	0
7	0	32	0
8	0	33	0
9	0	34	0
10	0	35	0
11	0	36	0
12	0	37	0
13	0	38	4.7
14	2.8	39	0
15	2.7	40	4.6
16	0	41	0
17	4.7	42	4.6
18	0		
19	1.3		
20	4.0		
21	0		
22	0		
23	0		
24	4.7		
25	0		

	IC101	IC102	IC201	IC202
Pin 1	0.1	4.4	(O) 5.0	(O) 3.5
2	0.1	1.4	(V) 8.4	(V) 8.1
3	0.1	1.5	(G) 0	(G) 0
4	0.1	1.5		
5	0.1	1.5		
6	0.1	4.7		
7	0.1	0		
8	0.1	4.9		
9	4.2	4.9		
10	0.7	4.8		
11	5.0	5.0		
12	0.5	5.0		
13	5.0	5.0		
14	4.1	5.0		
15	0			
16	5.0			

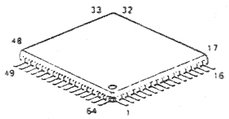
	TR101	TR102	TR103	TR104	TR105	TR106
B	4.8	0.2	0.6	0	1.5	0.9
C	0.5	4.1	0	4.9	0	0
E	5.0	0	0	0	1.5	1.2

COMPONENT SIDE



APEARANCE OF IC, TRANSISTOR AND DIODE

UPD75106GF1



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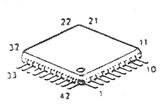

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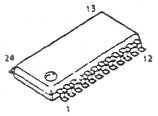

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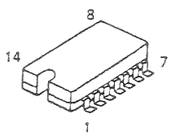

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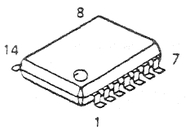

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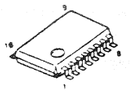

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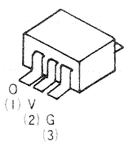
S81250HGRDT1



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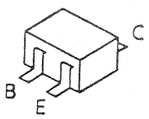

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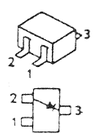

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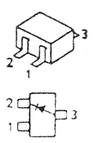
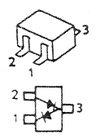


MA153

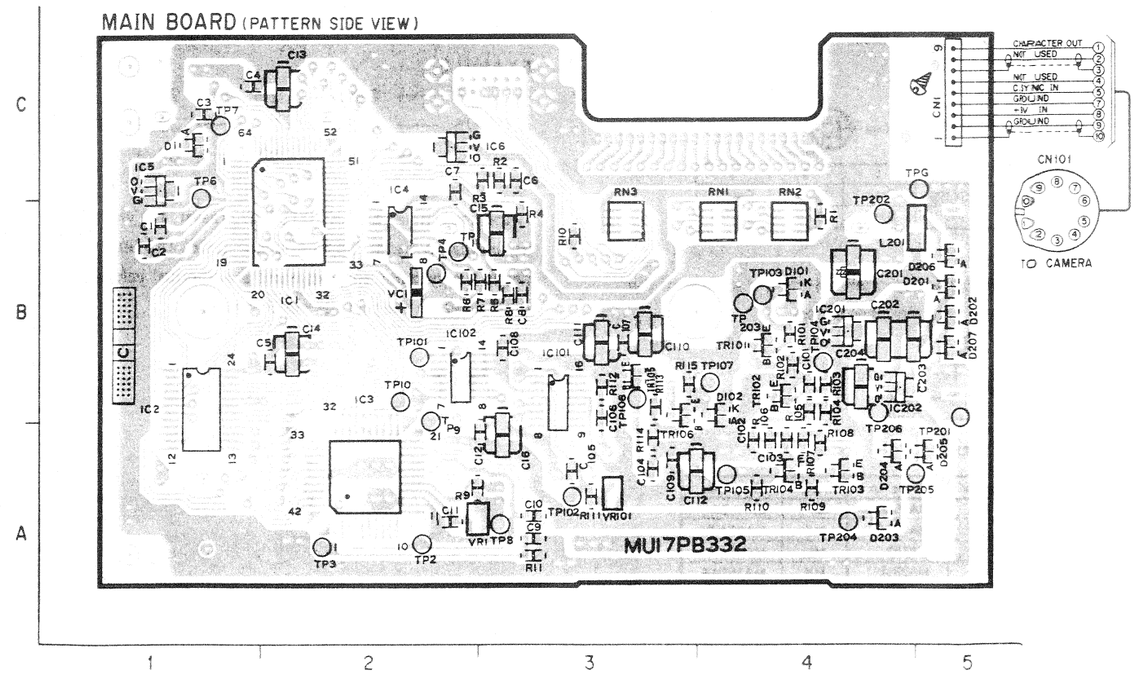


PATTERN SIDE

Main Board

<Index>

IC1	B2
IC2	B1
IC3	A2
IC4	B2
IC5	C1
IC6	C2
IC101	B3
IC102	B2
IC201	B4
IC202	B4
TR101	B4
TR102	B4
TR103	A4
TR104	A4
TR105	B3
TR106	B3
D1	C1
D101	B4
D102	B4
D201	B5
D202	B5
D203	A4
D204	A4
D205	A5
D206	B5
D207	B5



CHIP COMPONENTS

1. Chip Transistor

The transistor number is indicated on the top surface of the chip transistor using two alphabet letters or one numerical and two alphabet letters.

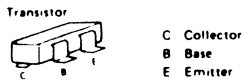
Transistor Number

Letter	Transistor No.	Letter	Transistor No.
A	2SB709	X	2SD602A
B	2SB709A	Y	2SD601
C	2SB710	Z	2SD601A
D	2SB710A	1Z	2SD1030
E	2SA1022	1N	2SK199
F	2SA1034	1O	2SK198
H	2SA1035	1A	2SB799
I	2SB792	1B	2SB814
K	2SC2778	1C	2SB902
P	2SD814	1F	2SK321
Q	2SD813	1L	2SK247
R	2SC2480	1K	2SK316
S	2SC2405	1M	2SJ84
T	2SC2406	1T	2SC3077
U	2SC2404	1X	2SC2845
V	2SC2295	2B	2SK374
W	2SD602	2C	2SK116

Example

WQ ⟶ 2SD602 – Q
YQ ⟶ 2SD601 – Q
1BS ⟶ 2SB814 – S

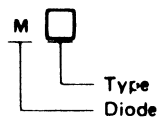
Appearance and Symbols



	1	2	3
Except 2SK199	Drain	Source	Gate
2SK199	Gate	Drain	Source

2. Chip Diode

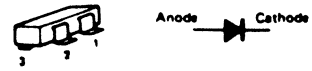
The diode number is indicated on the top surface of the chip diode using Two alphabet letters.



Diode Number

Letter	Diode No.	Letter	Diode No.
MA	MA151A	MI	MA152K
MB	MA152A	MK	MA28W-B
MC	MA153	ML	MA28T-A
MD	MA28 A	MN	MA151WA
ME	MA28 B	MO	MA152WA
MF	MA28W A	MT	MA151WK
MH	MA151K	MU	MA152WK

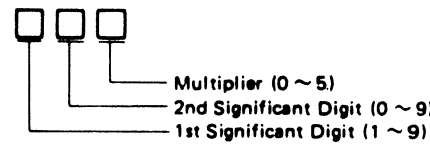
Appearance and Symbols



	1	2	3
MA28/28W/28T	–	Anode	Cathode
MA151K/152K	–	Anode	Cathode
MA151A/152A	–	Cathode	Anode
MA151WK/MA152WK	Anode	Anode	Cathode
MA151WA/MA152WA	Cathode	Cathode	Anode
MA153	Cathode	Anode	Common

3. Chip Resistor

The resistor value is indicated on the bottom surface of the chip resistor using three digit numbers.



EXAMPLE:

330 ⟶ 33×10^0 = 33 ohms
561 ⟶ 56×10^1 = 560 ohms
123 ⟶ 12×10^3 = 12 kohms

Note: Zero ohm resistor (jumper chip) is colored red or green.

4. Chip Capacitor

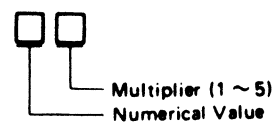
The capacitive value of replacement chip capacitors is indicated on the bottom surface. Original parts do not have value indication.

If the capacitive value is less than 100 pF, the value will be indicated by one or two digit number expressing the capacity directly in pF.

EXAMPLE:

0.5 ⟶	0.5 pF	2.5 ⟶	2.5 pF
75 ⟶	0.75 pF	33 ⟶	33 pF
1 ⟶	1 pF	82 ⟶	82 pF

If the capacitive value is 100 pF or greater, the value will be indicated by an alpha-numeric code. The letter precedes the number and expresses a numerical value to be multiplied by the number which follows.



Numerical Value

Letter	Value	Letter	Value
A	10	N	33
B	11	P	36
C	12	Q	39
D	13	R	43
E	15	S	47
F	16	T	51
G	18	U	56
H	20	V	62
J	22	W	68
K	24	X	75
L	27	Y	82
M	30	Z	91

* Letters I and O are not used

EXAMPLE:

A1 ⟶ $10 \times 10^1 = 100$ pF

N2 ⟶ $33 \times 10^2 = 3300$ pF

S3 ⟶ $47 \times 10^3 = 47000$ pF

5. Precautions in replacing the chip component

1 Make sure that the unit is turned OFF when replacing the chip

2. Use tweezers to prevent any damage to the chip surface

3. Do not re-use the chips after removal

4. Do not rub the electrode of chips

5 Do not subject the chips to excessive stress

6 It is recommended that a pencil-type soldering iron to be used

7. The solder whose diameter is less than 0.5 mm is recommended

8 Do not heat the chip beyond 3 seconds

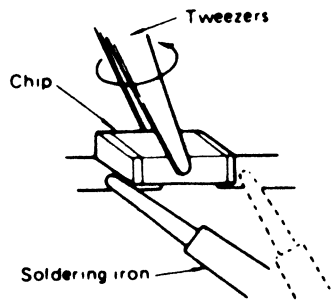
9 Maintain temperature control under 260°C (500°F) when soldering

5-1 Removal (Transistor, Diode, Resistor and Capacitor)

1 Add the solder to both ends of the chip (three leads for chip transistor).

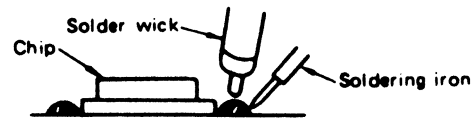
2 While attaching the soldering iron to both ends of the chip (three leads for chip transistor) as shown below, remove the chip by turning it with tweezers

Note Be careful not to damage other chips

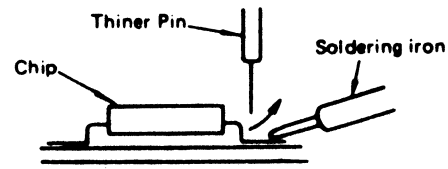


5-2 Removal (IC)

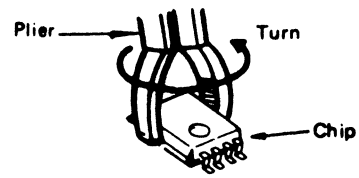
1. Add the solder wick and solder iron to each lead of the IC and remove solder.



2. Add the solder iron to each lead of the IC and left each lead of the IC using thiner pin.



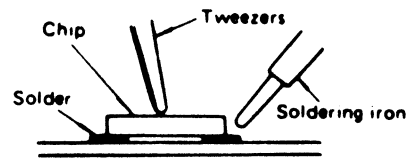
3. Remove IC turning it with plier.



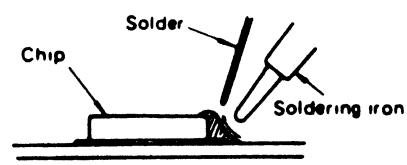
5-3 Mounting

1 Place the solder thinly on the chip mounting foil

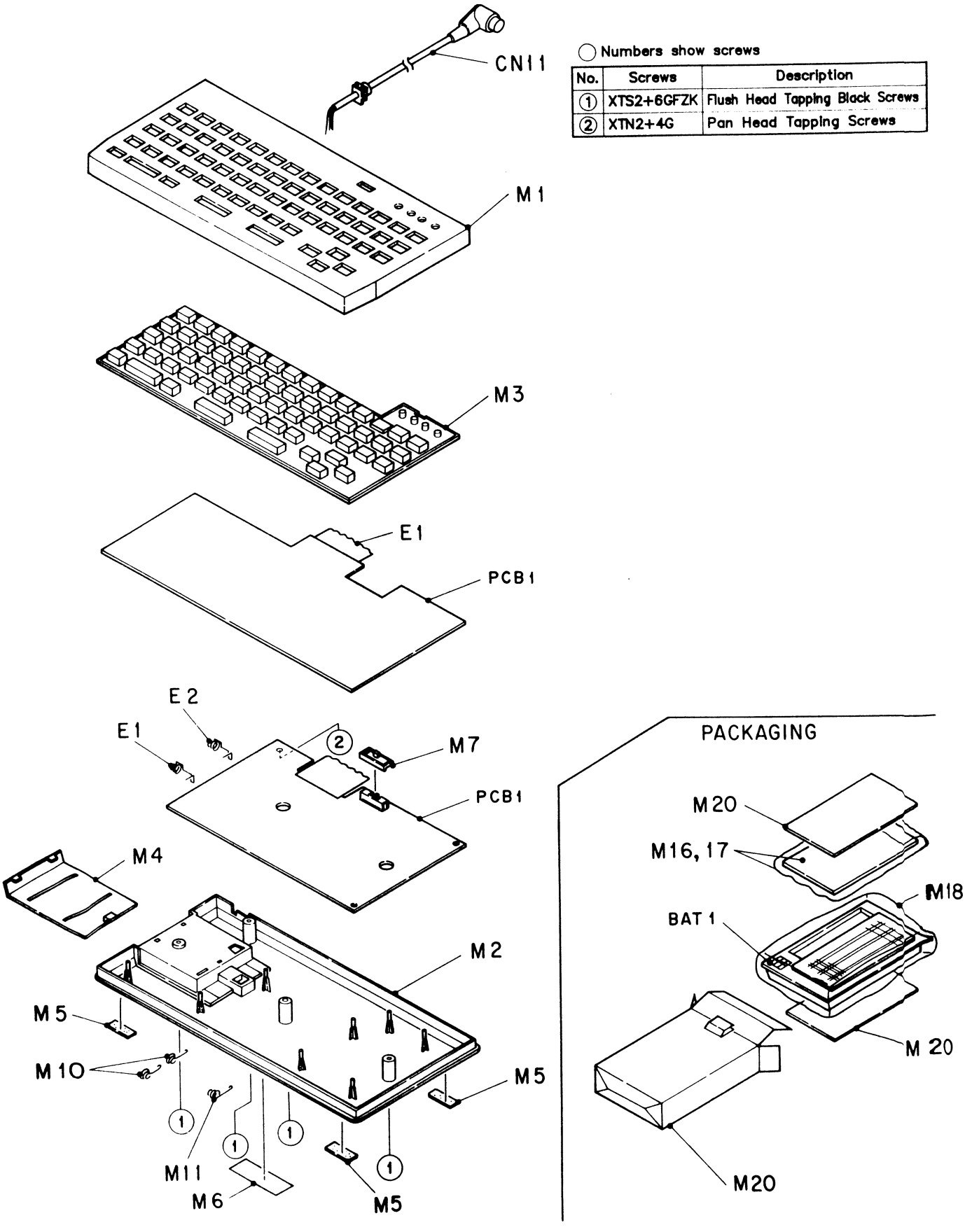
2 Solder the chip temporarily while holding the chip with the tweezers



3. Solder both ends of chip (three leads for chip transistor)



EXPLODED VIEW



◯ Numbers show screws

No.	Screws	Description
①	XTS2+6GFZK	Flush Head Tapping Black Screws
②	XTN2+4G	Pan Head Tapping Screws

REPLACEMENT PARTS LIST

Important Notice

1. Components identified by "⚠" mark have special characteristics important for safety.
   When replacing any of these components, use only manufacturer's specified parts.
2. Printed circuit board assembly with mark (NLA) is no longer available after production discontinuation of the complete set.

REF.NO.	PART NO.	DESCRIPTION
MISCELLANEOUS		
CN1	YWMU17CD329	Cable Connector Assy
E1	YWMU17JP328	Flexible Wire
M1	MU17CS320PB	Upper Cover for WJ-TTL5E
	MU17CS320PA	Upper Cover for WJ-KB15E
M2	MU17CS321PB	Bottom Cover for WJ-TTL5E
	MU17CS321PA	Bottom Cover for WJ-KB15E
M3	MU17CT323PB	Rbber Contact for WJ-TTL5E
	MU17CT323PA	Rbber Contact for WJ-KB15E
M4	MU17EC322PB	Battery Cover for WJ-TTL5E
	MU17EC322PA	Battery Cover for WJ-KB15E
M5	YWMU17GL327	Rbber Foot
M6	YWMU17LB351	Main Label for WJ-TTL5E
	YWMU17LB330	Main Label for WJ-KB15E
M7	YWMU17SD273	Knob
M8	YWMU17TD324	Battery Terminal +
M9	YWMU17TD325	Battery Terminal -
M10	YWMU17TD326	Battery Terminal A
M10	YWMU17TD338	Battery Terminal B

REF.NO.	PART NO.	DESCRIPTION
MAIN BOARD		
PCB1 (NLA)	YWMU17VPB115	Printed Circit Board Assy
IC1	UPD75106GF1	IC1
IC2	YWLC3517BML	IC1
IC3	MN1287EAV	IC1
IC4	TC4007UBF	IC1
IC5	S8052ALYHT1	IC1
IC6	S8054ALBLMT1	IC1
IC101	UPD4538BG	IC1
IC102	UPD4081G	IC1
IC201	S81250HGRDT1	IC1
IC202	S81235AGR1T1	IC1
TR102-105	2SD601RTW	Transistor
TR106	2SD709RTW	Transistor
D1	MA151ATW	Diode
D101,102	MA153TW	Diode
D201	MA151ATW	Diode
D202-205	MA704TW	Diode
D206,207	MA3120MTW	Diode
TH1	ERTD2FHK332S	Thermister
R1	ERJ6GEYJ154V	Carbon 150Kohms 1 /W
R2	ERJ6GEYJ104V	Carbon 100 Kohms 1 /W
R3	ERJ6GEY0R00V	Jumper Resistor 0 ohms
R4	ERJ6GEYJ104V	Carbon 100K ohms 1 /W
R5,6	ERJ6GEYJ222V	Carbon 2.2K ohms 1 /W
R7	ERJ6GEYJ106V	Carbon 10M ohms 1 /W
R8	ERJ6GEYJ474V	Carbon 470K ohms 1 /W
R9	ERJ6GEYJ273V	Carbon 270K ohms 1 /W
R10	ERJ6GEYJ0R00V	Carbon 0 ohms1 /W
R11	ERJ6GEYJ153V	Carbon 150K ohms 1 /W
R101	ERJ6GEYJ273V	Carbon 10K ohms 1 /W
R102	ERJ6GEYJ0R00V	Carbon 2.2K ohms 1 /W
R103	ERJ6GEYJ153V	Carbon 10K ohms 1 /W
R104	ERJ6GEYJ222V	Carbon 2.2K ohms 1 /W
R105	ERJ6GEYJ123V	Carbon 12K ohms 1 /W
R106	ERJ6GEYJ273V	Carbon 27K ohms 1 /W
R107	ERJ6GEYJ104V	Carbon 100K ohms 1 /W
R108	ERJ6GEYJ224V	Carbon 220K ohms 1 /W
R109,110	ERJ6GEYJ473V	Carbon 47K ohms 1 /W
R111	ERJ6GEYJ394V	Carbon 390K ohms 1 /W
R112	ERJ6GEYJ683V	Carbon 68K ohms 1 /W
R113	ERJ6GEYJ472V	Carbon 4.7K ohms 1 /W
R114	ERJ6GEYJ822V	Carbon 8.2K ohms 1 /W
R115	ERJ6GEYJ332V	Carbon 3.3K ohms 1 /W
VR1	EVM7SW30B53	Variable Resistor 5K ohms

REF.NO.	PART NO.	DESCRIPTION
VR101	EVM7SW30B25	Variable Resistor 200K ohms
RN1-3	EXBS8V154J	BLock Resistor
C1,2	ECUV1H330JCG	Plastic 33 pF
C3	ECUV1H101JCGJCG	Plastic 1 00 pF
C4,5	ECUV1H103KBG	Plastic 0.01 µF
C6	ECUV1H101JCG	Plastic 100 pF
C7	ECUV1H103KBG	Plastic 0.01 µF
C8	ECUV1H220JCN	Plastic 22 pF
C9,10	ECUV1H101JCG	Plastic 100 pF
C11	ECUV1H180JCN	Plastic 18 pF
C12	ECUV1H103KBG	Plastic 0.01 µF
C13-16	ECUV1CA100R	Plastic 10 pF
C101	ECUV1H471JCG	Plastic 470 pF
C102,103	ECUV1H102JCG	Plastic 1000 pF
C104	ECUV1H180JCN	Plastic 18 pF
C105,106	ECUV1H101JCG	Plastic 100 pF
C107-109	ECUV1H103KBG	Plastic 0.01 µF
C110-112	ECUV1CA100R	Electrolytic 10 µF 16V
C201	ECEV1CA100R	Electrolytic 47 µF 16V
C202-204	ECEV1CA101R	Electrolytic 100 µF 16V
VC201	ECRJA020E12X	Variable Capacitor 20 pF
L201	ELJPA100KF	Coil 10 µH
SW1	ESD14511	Slide SWitch
X1	YWCSA2.00MG	Crystal Oscillator
X2	YWKF38PO	Crystal Oscillator
E1	MU17TD324	Electrode (+)
E2	MU17TD325	Electrode (-)
CN1	YWS9B-PH-K-S	9-pin Connector
CN2	MU17JP328	20-pin Connector

REF.NO.	PART NO.	DESCRIPTION
ACCESSORY PARTS/PACKAGING PARTS		
M16	YWV8QA2197AN	Operating Instrctions for WJ-TTL5E
	YWV8QA2195AN	Operating Instrctions for WJ-KB15E
M17	YWT20X35C03	Polyethylene Bag
M18	XZB26X40C05	Polyethylene Bag
M20	YWMU17VPC118	Packaging Assy for WJ-TTL5E
	YWMU17VPC116	Packaging Assy for WJ-KB15E